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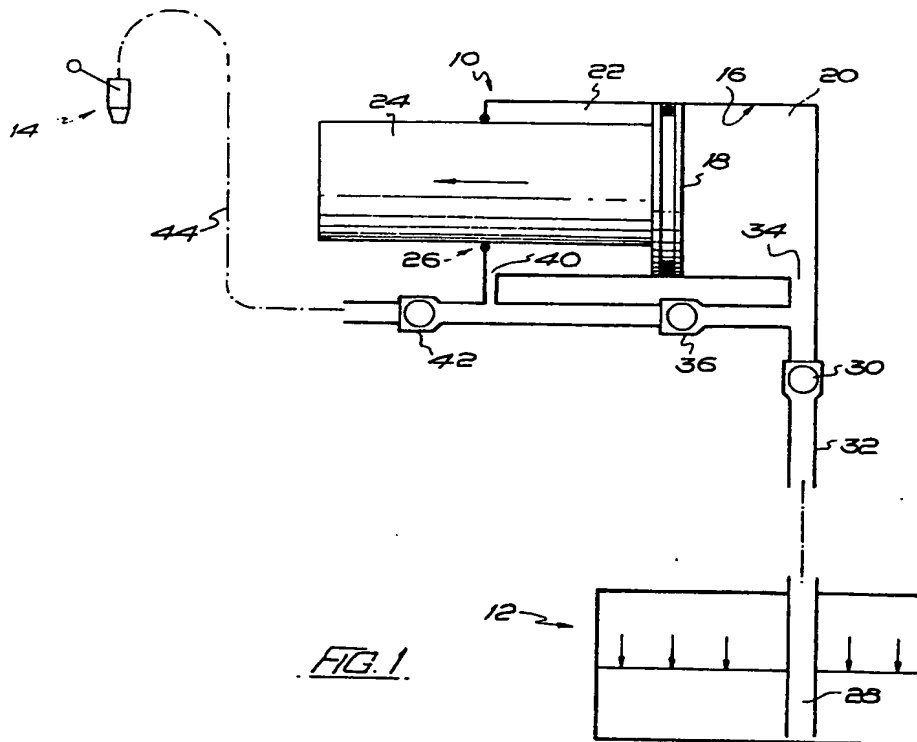
Selected US specifications from IPC sub-class F04B

(54) Liquid dispense system

(57) A liquid dispense system includes a liquid meter having a cylindrical chamber (16) containing a slidable piston (18) the arrangement of valves and ducts being such that movement of the piston in one direction dispenses a quantity of liquid from one end (20) of the chamber accompanied by a replenishing flow of liquid into the other end of the chamber (22), and movement of the piston in the reverse direction reverses the operation of the meter to dispense the same volume of liquid from said other end of the chamber.

In order to avoid the need for a supply pump, the slidable piston (18) may be driven to and fro by a motor.

Solenoid generated valves may be included upstream of valve (30) and downstream of valve (36).



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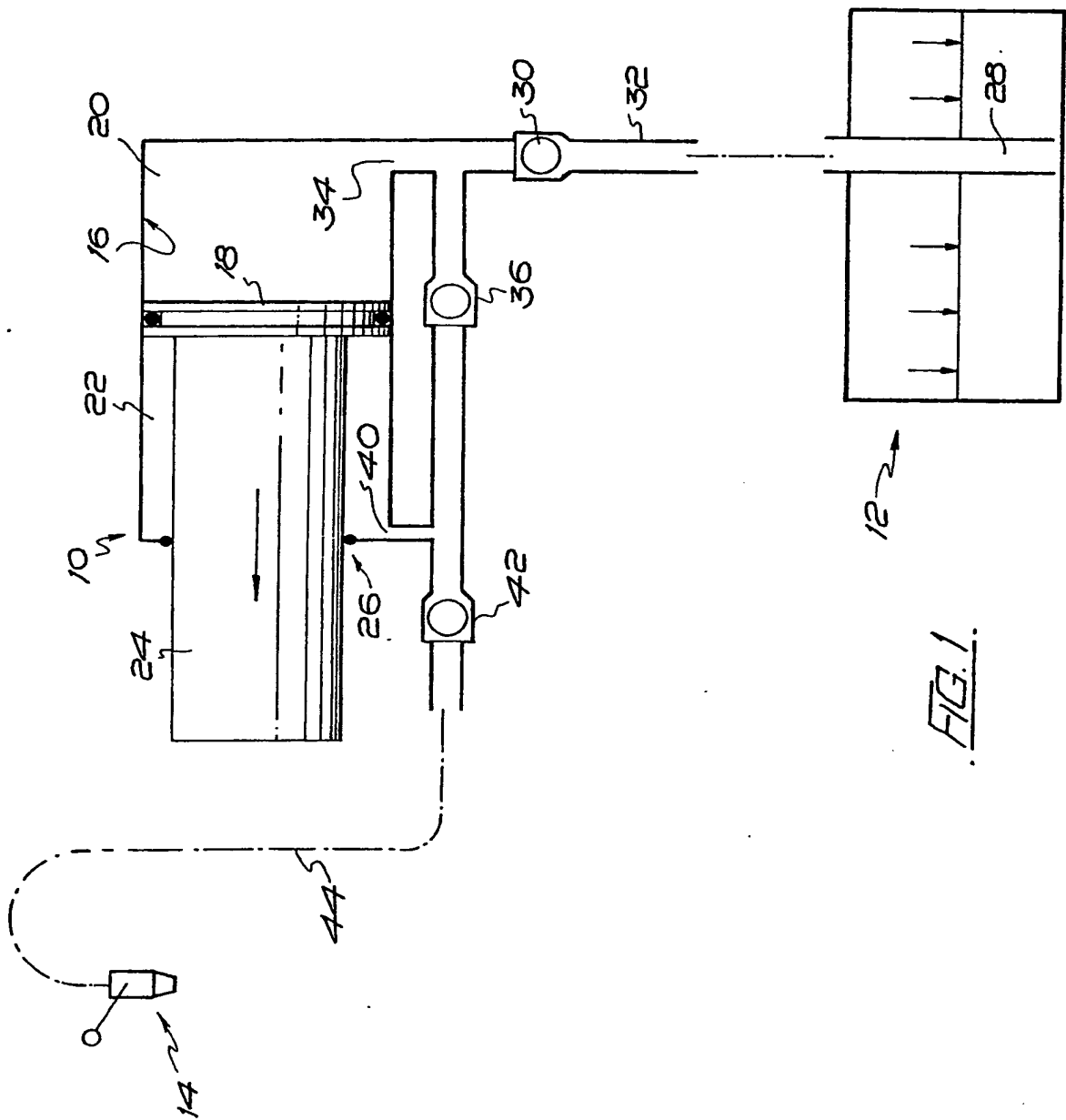


FIG. 1.



SPECIFICATION

Liquid dispense system

5 This invention relates to a liquid dispense system, primarily conceived as an alternative to existing equipment for dispensing beer and lager. However the system could well be used for other liquids which need not be alcoholic beverages (although the system is primarily intended for applications where a specified quantity must be dispensed with accuracy).

10 Beer dispense systems are well known and usually include a beer meter comprising a metering chamber connected to inlet and outlet ports, the chamber either having a flexible diaphragm or a slidable free piston which effectively divides the chamber into two compartments. The flow of beer (or lager) to and from the metering chamber is usually controlled by four relay operated solenoid valves, pairs of which are arranged to open and close alternately so that beer is allowed to flow from the inlet port into the compartment on one side of the flexible diaphragm or slidable piston, as the case may be, and out of the compartment on the other side of said diaphragm or piston to a dispense tap, the next dispense operation reversing the operation of the meter to dispense the same volume of beer on the reverse movement of the diaphragm or piston. The beer is generally pumped to the inlet port by means of a motor driven pump, and in practice, in a public house or licensed club there will generally be several beer meters supplied with beer from a single motor driven pump with the result that if one pump breaks down there will be several beer meters out of action until the pump is repaired.

40 An object of the invention is to provide an alternative construction of liquid meter so that it will not be necessary for several meters to be dependent on a single pump (at least in certain, commonly encountered circumstances). The entire installation of a plurality of meters embodying the invention might well be of roughly the same cost as a similar number of conventional meters with a single pump as previously installed.

50 According to the invention, there is provided a liquid dispense system including a liquid meter having a cylindrical chamber containing a piston formed at the end of a piston rod, the piston dividing the cylindrical chamber into two separate compartments one of which is smaller than the other by virtue of it being an annular chamber surrounding the piston rod, the extreme end of the larger one of said compartments being arranged to communicate with a supply of liquid by way of a check valve and the extreme end of the smaller one of said compartments being arranged to communicate with a dispense tap by way of a further check valve and there being a still fur-

ther check valve between the two compartments, the arrangement being such that a movement in one direction of said piston causes a flow of liquid from the supply into the larger one of the two compartments and a simultaneous flow from the smaller one of said compartments to the dispense tap, and such that a movement of said piston in its opposite direction causes a flow of liquid from the larger one of the two compartments, a proportion of that flow of liquid replenishing the smaller one of the two compartments and the remainder flowing to the dispense tap. Preferably, the maximum volume of the larger one of the two compartments will be exactly twice the volume of the smaller compartment in which case, if the maximum volume of said larger one of the compartments is (say) one pint, the system will dispense one half pint during each sliding movement of the piston. If the larger compartment is not twice the volume of the smaller one, it may well be near to this, e.g. between three and one and a half times the volume of the smaller one.

90 Preferably, also, the system will have a pair of positive closure valves, one being located in the liquid conveying line between the supply of liquid and the larger of the two compartments of the chamber and the other being located in the liquid line leading to the dispense tap or in a line connecting the two compartments of the chamber. The pair of positive closure valves will preferably be electrically operated solenoid valves but may be operated by other means.

100 This invention also embraces a liquid meter, as set forth above, for use in a dispense system as defined above.

105 In order that the invention may be fully understood and readily carried into effect, an embodiment thereof will now be described, by way of example only, with reference to the accompanying drawings, of which:

110 Figure 1 is a diagrammatic illustration of a liquid dispense system embodying the invention, and

Figure 2 is a possible modification of Figure 1, which will be described.

115 For convenience the liquid dispense system in the drawing will be described as a beer dispense system, dispensing in quantities of half pints (within the limits allowed by U.K. Weights and Measures regulations).

120 Referring now to Figure 1 of the drawings, the beer dispense system there illustrated includes a beer dispense meter generally indicated 10, a storage container 12 and a dispense tap 14 which may be located in a bar.

125 As shown, the beer dispense meter 10 has a cylindrical chamber 16 containing a piston 18 which effectively divides the chamber into two compartments 20 and 22. However, in this case the piston is not a free piston but is formed at the end of a piston rod 24 which extends slidably through a sealing ring 26 in

one end of the chamber. The cross sectional area of the piston rod is exactly half the cross sectional area of the cylindrical chamber. Consequently, if the stroke of the piston in the cylindrical chamber is such that 1 pint of beer is admitted to or displaced from the compartment 20, exactly one half pint of beer will be displaced from or admitted to the annular compartment 22.

- 5 The supply of beer to the meter is by way of a dip tube 28 which extends almost to the bottom of the storage container 12 (and a top pressure of carbon dioxide gas will be maintained on the beer in the container as indicated by the arrows in the drawing). A first non-return valve 30 is located in the supply line 32 from the dip tube to an inlet/outlet port 34 which opens from the compartment 20. A second non-return valve 36 is located in a by-pass line 38 between the inlet/outlet port 34 and an inlet/outlet port 40 which opens from the compartment

- 20 22. A third non-return valve 42 is located in a delivery line 44 which extends from the by-pass line 38 to the dispense tap 14.

- 25 Means (not shown) are provided for acting on the piston rod 24 to traverse the piston 18 between its two extreme positions in the cylindrical chamber. When being moved to the left, as indicated by the arrow in the drawing, the piston displaces one half pint of beer from the annular compartment 22 and this quantity of beer is dispensed from the dispense tap 14 via the non-return valve 42 (the non-return valve 36 remaining closed). At the same time a full pint of beer is drawn into the compartment 20. During the next metering movement of the piston, that is to say during the return movement of the piston to the right hand end of the cylindrical chamber, that full pint of beer in the compartment 20 is displaced from that compartment but half that amount is drawn into the annular compartment 22 by way of the non-return valve 36. Consequently, one half pint of beer is again dispensed from the dispense tap 14 via the non-return valve 42.

- It will of course be understood that if it is desired to dispense a full pint of beer, the piston of the just described arrangement has to be made to traverse the length of the cylindrical chamber twice in quick succession. On the other hand, if the two compartments of the chamber 16 were made of half the original volume, so that for one half pint to be dispensed the piston had to be made to traverse the length of the chamber twice, this would have the advantage that it would no longer be necessary for the swept volume of the compartment 22 to be exactly half the swept volume of the compartment 20. It would simply be necessary for the swept volume of the compartment 20 to be exactly one half pint (within the limits allowed by the Weights and Measures regulations).

Referring now to Figure 2, in this modified arrangement, which is otherwise the same as that described above, it will be seen that there are a further two valves 46 and 48 in the beer dispense circuit, these being positive closure valves, that is to say electrically operated solenoid valves which are closed when the dispense tap 14 is closed and opened when the dispense tap is opened. The valve 46 is located in the beer line between the supply of beer and the compartment 20 of the cylindrical chamber 16. The valve 48 is located in the beer line leading to the beer dispense tap. The purpose of these two further valves is to ensure that, when the dispense tap is closed, the top pressure of gas on the supply of beer in the storage container 12 cannot cause leakage of beer through the system.

- 85 Various other modifications may be made and it will be understood that the piston rod 24 can be acted on by a variety of mechanisms to traverse the piston between its two extreme positions.

- 90 Because these systems have the piston 18 driven to and fro by a motor, there is no need for a supply pump, provided the top pressure on the beer provides some pressure, which will generally be the case. In this event a plurality of meters will not become dependent on a single such pump.

- It should be appreciated that this system could readily dispense some other beverage, such as cider, lager, even wine or a soft drink with top pressure.

- The quantity dispensed is regulated by the cylinder size, of course. It need not be half pints. A metric volume of 250 ml could be entirely possible, for instance.

CLAIMS

1. A liquid dispense system including a liquid meter having a cylindrical chamber containing a piston formed at the end of a piston rod, the piston dividing the cylindrical chamber into two separate compartments one of which is smaller than the other by virtue of it being an annular chamber surrounding the piston rod, the extreme end of the larger one of said compartments being arranged to communicate with a supply of liquid by way of a check valve and the extreme end of the smaller one of said compartments being arranged to communicate with a dispense tap by way of a further check valve and there being a still further check valve between the two compartments, the arrangement being such that a movement in one direction of said piston causes a flow of liquid from the supply into the larger one of the two compartments and a simultaneous flow from the smaller one of said compartments to the dispense tap, and such that a movement of said piston in the opposite direction causes a flow of liquid from the larger one of the two compartments, a

proportion of that flow of liquid replenishing the smaller of the two compartments and the remainder flowing to the dispense tap.

- 5 2. A liquid dispense system according to claim 1, in which the maximum volume of the larger one of the two compartments is exactly twice the volume of the smaller compartment so that, if the maximum volume of said larger one of the compartments is (say) one pint, the
10 system will dispense one half pint during each sliding movement of the piston.

- 15 3. A liquid dispense system according to either one of the preceding claims, having a pair of positive closure valves, one being located in the liquid conveying line between the supply of liquid and the larger of the two compartments of the chamber and the other being located in the liquid line leading to the dispense tap or in a line connecting the two
20 compartments of the chamber.

4. A liquid dispense system according to claim 3, in which the pair of positive closure valves are electrically operated solenoid valves.

- 25 5. A liquid dispense system, constructed, arranged and adapted to operate substantially as hereinbefore described with reference to and as illustrated by the accompanying drawings.

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